ISSN 1809-127X (online edition)
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Journal of species lists and distribution

NOTES ON GEOGRAPHIC DISTRIBUTION

Digenea, Strigeidae, *Australapatemon canadensis* Dubois and Rausch, 1950: First record in South America and a new host record

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ABSTRACT: *Australapatemon canadensis* Dubois and Rausch, 1950 (Digenea, Strigeidae) is reported parasitizing to *Cygnus melancoryphus* (Molina) (Anatidae) from Lacombe Lagoon, Buenos Aires Province and Pellegrini Lake Río Negro Province, Argentina. This species is described and compared with related species. The finding of *A. canadensis* in *C. melancoryphus* in Argentina represents a new host record extending to South America the geographical distribution of this species.

The genus *Australapatemon* Sudarikov, 1959 is characterized by possessing a genital cone well delimited from parenchyma and an ejaculatory duct with internal rugae (Niewiadomska 2002). At present, this genus contains nine species, reported as parasites of birds: *A. anseris* Dubois, 1967 in Anatidae from Palaearctic region (Dubois 1968); *A. bdellocystis* (Lutz, 1921) in Anatidae, Ardeidae, Cathartidae and Laridae from Neotropical region (Szidat 1929; Dubois 1968; Boero and Led 1968; Dubois 1970; 1985; Arruda *et al*. 2001; Noronha *et al*. 2009); *A. burti* (Miller, 1923) in Anatidae from Nearctic and Andina regions (Dubois 1968; Dubois 1974; 1978; Drago *et al.* 2007); *A. canadensis* Dubois and Rausch, 1950 in Anatidae from Nearctic region (Dubois 1968; Ewart and McLaughlin 1990); *A. congolensis* Dubois and Fain, 1956 in Anatidae from Ethiopic region (Dubois 1968); *A. fuhrmanni* Dubois, 1937 in Anatidae from Palaearctic region (Dubois 1968); *A. intermedius* (Johnston, 1904) in Anatidae and Accipitridae from Australian region (Dubois 1968; Dubois and Angel 1972; Mawson *et al.* 1986); *A. magnacetabulum* Dubois, 1988 in Strigidae and Accipitridae from Neotropical region (Dubois 1988), and *A. minor* Yamaguti, 1933 in Anatidae from Oriental and Palaearctic regions (Dubois 1968; 1974).

During investigations into helminth parasites of birds from Argentina, one specimen of *Cygnus melancoryphus* (Molina) was captured by shot gun, with permission of the Ministerio de Asuntos Agrarios, in Lacombe Lagoon, Chascomús, Buenos Aires Province, Argentina. The bird was dissected in the field; the viscera were preserved in 10 % formalin and transported to the laboratory for examination according to Langeron (1942). The viscera were examined under stereoscopic microscopy. The digeneans were removed and stored in 70 % ethanol, stained with a 1:6 dilution in 96 % ethanol of hydrochloric carmine, dehydrated and mounted in Canada balsam between two microscope cover glasses in order to facilitate handling and observation. Measurements are given in micrometers (µm) unless otherwise stated, as the range followed by mean in parentheses. This material was deposited in the Helminthological Collection of Museo de La Plata (MLP), La Plata, Argentina. In addition, we also studied 14 whole mount specimens and one set of serial sagittal sections from *C. melancoryphus* collected in Pellegrini Lake, Cinco Saltos, Río Negro Province stored in the Helminthological Collection of MLP.

Australapatemon canadensis Dubois and Rausch, 1950 (Figures 1-3, Tables 1 and 2).

Synonyms: *Apatemon gracilis ex parte* Dubois and Rausch, 1948, *nec* Rudolphi, 1819

Apatemon gracilis canadensis Dubois and Rausch, 1950

Apatemon (*Australapatemom*) *canadensis* Dubois and Rausch, 1950 in Dubois (1967).

Host: Black-necked Swan, *Cygnus melancoryphus* (Molina) (Anatidae)

Site of infection: small intestine.

Localities and date: Lacombe Lagoon (35°51'42" S, 57°53'39" W), Lezama, Buenos Aires Province, Argentina; September 2003. Pellegrini Lake (38°42'15" S; 67°59'47" W), Cinco Saltos, Río Negro Province, Argentina; September 1980.

Material studied: 13 digenean specimens from Buenos Aires Province (MLP 6065); 15 digenean specimens from Pellegrini Lake (MLP 616-617/C).

To date, only two species of *Australapatemon* have been reported in the Neotropical Region: *A. bdellocystis* and *A. magnacetabulum.* The first species was reported in Argentina (as *Apatemon sphaerocephalus* Brandes, 1888) parasitizing the small intestine of *C. melancoryphus* from La Plata Zoological Garden, Buenos Aires Province (Boero and Led 1968); in Brazil [as *Apatemon* (*Australapatemon*) *bdellocystis* (Lutz, 1921), *Apatemon globiceps* Dubois, 1937] parasitizing *Amazonetta brasiliensis* (Gmelin)

Table 1. Comparative data on *Australapatemon canadensis* from Argentina and Neotropical species of the genus *Australapatemon*.

	A. bdellocystis		*A. magnacetabulum*	*A. canadensis*
References	Dubois (1968)	Dubois (1985)	Dubois (1988)	Present study
Locality	Brazil	Paraguay	Paraguay	Argentina
Host	*Cairina moschata*	*Dendrocygna viduata*	*Strix rufipes*	*Cygnus melancoryphus*
Body length	until 2.5 mm	0.96-1.15 mm	1.08-1.40	1.624-2.914 (2.384) mm
Forebody	800 in diameter	270-350 x 300-350	420-450 x 360-370	464-1086 x 493-971 (765 x 760)
Hindbody	--- x 800	690-800 x 280-330	660-950 x 270-310	1122-2029 x 464-793 (1631 x 646)
Oral sucker	150 in diameter	105 x 65	92-95 x 70-80	71-157 x 114-174 (115 x 133)
Ventral sucker	200 in diameter	130-136 x 151-157	130-200 x 105-170	126-251 x 126-248 (209 x 193)
Proteolytic gland	------	-----	120-190 x 90-95	55-193 x 136-251 (132 x 189)
Pharynx	100	------	70-73 x 55-68	48-97 x 38-97 (75 x 60)
Ovary	200 in diameter	57-70 x 100-105	63-105 x 90-115	119-169 x 198-237 (148 x 217)
Testes	round	lobed	lobed	lobed
Anterior testis	400-450 in diameter	110-130 x 140	75-165 x 105-175	238-386 x 274-444 (321 x 369)
Posterior testis	400-450 in diameter	170-175 x 190-200	75-190 x 120-235	286-459 x 251-435 (369 x 342)
Genital cone	----	200-260 x 125-140	115-165 x 115-150	167-338 x 107-222 (221 x 148)
Ringnapf	absent	absent	absent	present
Number of eggs	---	1	3-4	4-80
Eggs	------	85 x 70	100-120 x 70-95	79-117 x 48-82 (103 x 62)

(Anatide), *Sterna* sp (Laridae), *Coragyps atratus* (Bechstein) (Cathartidae), *Tigrisoma lineatum* (Boddaert), *Nyctanassa violacea* (L.) (Ardeidae), *Cairina moschata* (L.) (Anatide), *Columba livia* Gmelin and *Columbina talpacoti* (Temminck) (Columbidae) (Dubois 1968; 1970; Arruda *et al.* 2001; Noronha *et al.* 2009); in Venezuela (as *A. globiceps*) parasitizing *A. brasiliensis* (Caballero y Caballero and Diaz-Ungria 1958), and Paraguay parasitizing *Dendrocygna viduata* (L.) (Anatidae) (Dubois 1985). *Australapatemon magnacetabulum* [as *Apatemon* (*Australapatemon*) *magnacetabulum* Dubois 1988] was reported in Paraguay parasitizing *Strix rufipes* King (Strigidae) and *Buteo magnirostris* (Gmelin) (Accipitridae) (Dubois 1988). The specimens from *A. bdellocystis* and *A. magnacetabulum* differ mainly from those here studied by the absence of a muscular ring in the genital atrium (*ringnapf*). Moreover, *A. bdellocystis* differs by having a spherical forebody and smaller eggs, whereas *A. magnacetabulum* differs in most metrical characters (Table 1).

Four other species of the genus, *A. canadensis*, *A. anseris*, *A. fuhrmanni* and *A. congolensis*, shares the presence of *ringnapf*. Among these species, only the specimens of *A. canadensis* have morphological characters in full agreement with those described in the present paper. Since the morphology of this species has been well described by Dubois (1968), only the measurements of the specimens here studied are presented (Table 2).

The strigeid, *A. canadensis* was originally described as *Apatemon gracilis* Dubois and Rausch, 1948 parasitizing *Branta canadensis* (L.) (Anatidae) from Alaska. Later, it was reported parasitizing other anatids, *Anas acuta* L., *Anas americana* Gmelin, *Anas carolinensis* Gmelin, *Clangula hyemalis* (L.), *Melanitta deglandi* (Bonaparte) and *Polysticta stelleri* (Pallas) from Alaska and *Bucephala albeola* (L.) from Canada (Dubois and Rausch 1950; Dubois 1967; 1968; Ewart and McLaughlin 1990).

The finding of *A. canadensis* in *C. melancoryphus* from Argentina represents a new host record extending to South America the geographical distribution of this species.

The life cycles of *Australapatemon* species include leeches as second intermediate hosts (Niewiadomska 2002). No full life cycle have been studied in the Neotropical region, however, *A. bdellocystis* was reported in *Planorbis* sp. (Gastropoda- Planorbidae) and *Clepsine* sp. (Hirudinea-Glossiphoniidae) from Brazil by Noronha *et al.* (2009). Given that the diet of the Black-necked Swan consists mainly of submerged aquatic plants, and occasionally algae, fish spawn, aquatic insects and other aquatic invertebrates (Carboneras 1992), probably the infected leeches are ingested together with the vegetation.

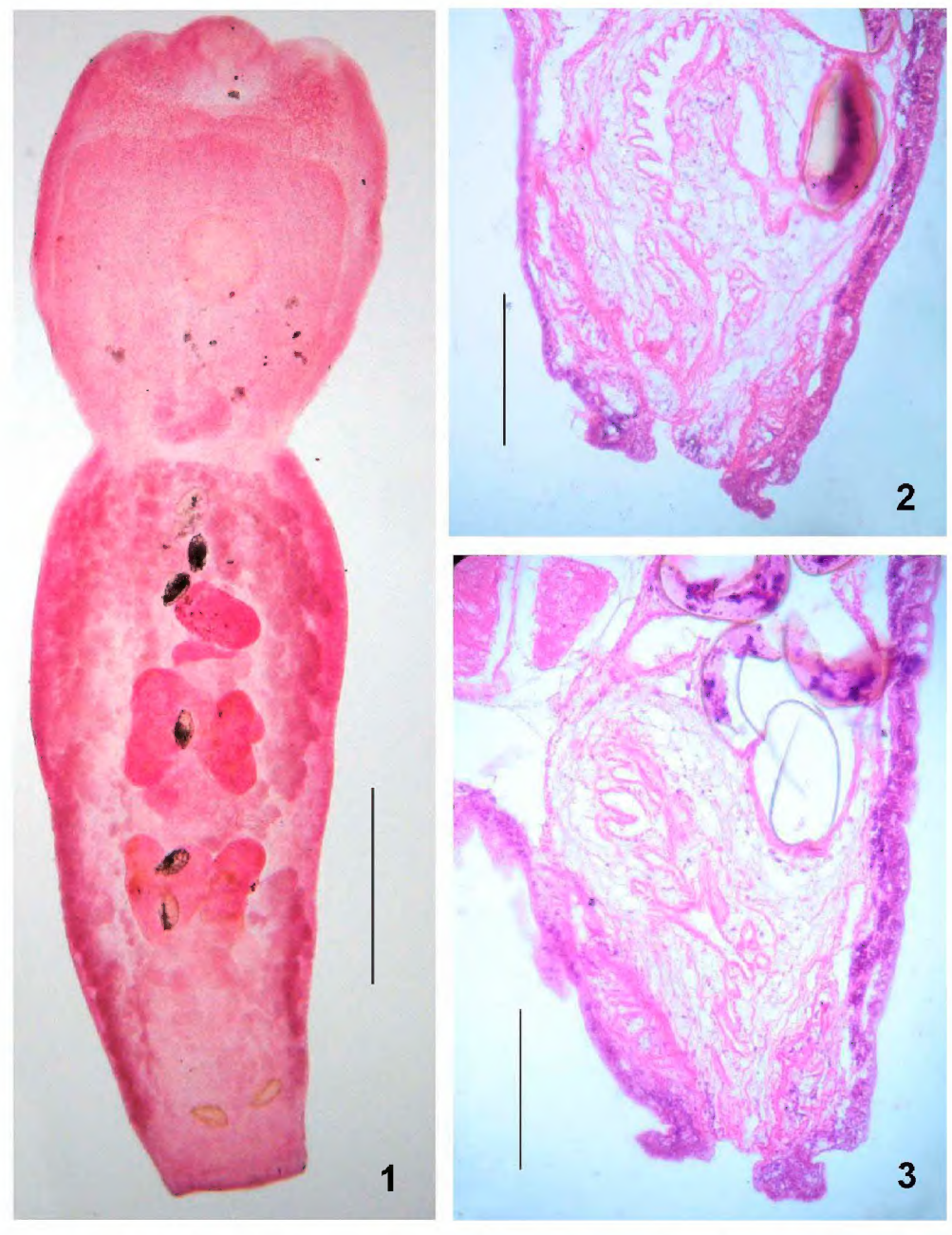

Figure 1-3. *Australapatemon canadensis* from *C. melancoryphus* from Cinco Saltos, Argentina. 1. Entire worm, ventral view. Bar = 500µm. 2-3. Sagital section of the genital cone showing the ejaculatory duct with internal rugae. Bar = 100µm.

Table 2. Comparative data for *Australapatemon canadensis*. References: BL/E: body length to egg length; HI/FO: hindbody length to forebody length ratio; OSW/PHW: oral sucker width to pharynx width; VSW/OSW: sucker-width ratio. * Calculated from descriptions given by Dubois (1968).

References	Dubois (1968)	Present study	
Locality	USA, Alaska	Río Negro Province	Buenos Aires Province
Body length	until 3.2 mm	2.4-2.9 (2.75) mm	1.6-2.4 (2.02) mm
Forebody	510-960 x 370-770	696-1086 x 696-971 (915 x 824)	464-774 x 493-774 (620 x 664)
Hindbody	870-2270 x 420-900	1700-2030 x 609-793 (1.84 x 690)	1120-1690 x 464-716 (1400 x 589)
Oral sucker	120-200 x 105-170	83-106 x 119-143 (95 x 131)	71-157 x 114-174 (130 x 133)
Ventral sucker	140-245 x 160-235	195-251 x 193-233 (218 x 217)	126-238 x 126-248 (202 x 175)
Proteolytic gland	70-105 x 140-190	145-251 x 95-193 (197 x 143)	55-98 x 136-155 (79 x 145)
Pharynx	60-85	64-71 x 50-60 (68 x 55)	48-97 x 38-97 (73 x 59)
Ovary	105-190 x 125-210	135 -169 x 198-237 (150 x 216)	119 x 224
Anterior testis	250-470 x 235-440	275-362 x 353-444 (324 x 380)	238-386 x 274-396 (312 x 331)
Posterior testis	335-640 x 240-475	290-372 x 251-415 (335 x 336)	286-459 x 262-435 (389 x 327)
Genital cone	235-470 x 180-330	167-214 x 119-167 (194 x 147)	238-338 x 107-222 (295 x 149)
Eggs number	20	13-80 (45)	4-25 (11)
Eggs	95-125 x 65-80	100-114 x 50-67 (107 x 56)	79-117 x 48-82 (101 x 68)
Ratios			
HI/FO	1.2-2.8 (2.1)	1.68-2.5 (2.05)	1.9-3.0 (2.3)
VSW/OSW	1.52-1.38*	1.38-1.83 (1.66)	0.8-1.6 (1.3)
OSW/PHW	2-2.3*	1.35-1.65 (1.5)	1.5-2.2 (1.7)
BL/E	26-34*	23-28 (25.7)	15-23 (20)

Acknowledgments: Special thanks are due to Ing. Agr. Marcelo Martínez Leanes and to Mr. Roberto Aranda for help and hospitality during our stay in Centro de Pesca San Jorge, Chascomús, Buenos Aires Province. The authors, Lía Lunaschi and Fabiana Drago are members of the Comisión de Investigaciones Científicas de la Provincia de Buenos Aires (CIC) and Universidad Nacional de La Plata (UNLP), respectively. The present study was funded by CIC (Res. Nº 578/08).

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Received: March 2010
Revised: May 2010
Accepted: May 2010
Published online: August 2010
Editorial responsibility: Simone Chinicz Cohen